MBS-1A PREALIGNED BORELIGHT USER'S MANUAL

Manufactured by

Laser Devices Inc.

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4/1/00

Warning: Laser Light

The MBS-1A borelight when activated emits a laser light that has been determined to pose a risk of eye injury. In order to avoid the possibility of injury, please adhere to the following warnings:

* **Avoid looking directly into the laser beam.**
* **Do not look directly at the laser light using scopes or binoculars.**
* **Avoid shining the laser onto mirrored surfaces.**
* **Do not direct the laser into the eyes or face of persons or animals.**
* **Observe all safety precautions with the laser that you would observe with a loaded firearm.**

WARRANTY INFORMATION

Laser Devices, Inc. (LDI) offers a one-year limited warranty from the date of original purchase against failure due to defect in design, parts and workmanship (normal wear and tear excluded). The warranty does not cover batteries and the plastic alignment inserts. The warranty is void if the product serial number has been removed or in the event the product has been misused, modified or neglected. LDI will replace defective products at its discretion. To the maximum extent permitted by law LDI disclaims all other warranties whether expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose. In no event shall LDI or its suppliers, distributors, dealers or agents be liable for any damages whatsoever (including without limitation damages for personal injury, wrongful death or pecuniary loss) arising out of the use or the inability to use any LDI manufactured product. This limited warranty gives the purchaser specific legal rights, which may vary from state to state or jurisdiction to jurisdiction.

Rules for Safe Use of the MBS-1A

ALWAYS use the factory supplied inserts and insert retaining screw.

ALWAYS when trueing the MBS-1A in the bore of the weapon turn the device in a clockwise direction.

ALWAYS when finished boresighting the weapon make sure that the insert and the retainer screw did not become detached in the barrel of the weapon.

ALWAYS remove the borelight from the weapon as soon as you have finished aligning the sight.

ALWAYS take your weapon to the range and test fire it to confirm proper sight alignment after using the borelight.

ALWAYS assume that the sight alignment calculated using the borelight is only an approximation of the actual impact point where a bullet will strike the target.

NEVER boresight a loaded gun.

Rules of Firearms Safety

ALWAYS keep the gun pointed in a safe direction.

ALWAYS keep your finger off the trigger until ready to shoot.

ALWAYS keep the gun unloaded until ready to use.

ALWAYS be sure the gun is safe to operate and the barrel is clear of any obstruction.

ALWAYS use the proper factory made ammunition for your particular gun.

ALWAYS know your target and what is beyond it.

ALWAYS wear eye and ear protection when shooting.

ALWAYS store guns and ammunition in separate locked containers so they are secure and not accessible to children or unauthorized persons.

ALWAYS treat every gun as if it were loaded.

NEVER use alcohol or drugs before or during handling a gun.

CHAPTER 4
TROUBLESHOOTING

Section 4.1. Unit Fails to Operate

1. Fails to operate.
   a. Replace the battery (see instructions).
   b. Check the battery installation to make sure the batteries were installed with the positive (+) terminal facing out.

2. Laser light is weak or dim.
   a. Replace the battery (see instructions).
   b. Check the front cap and lens of the laser to make sure that it is not covered with dirt. If the front cap is dirty, clean gently with a cotton swab or soft clean cloth taking care not to scratch the lens.

3. If the borelight still fails to operate, please contact the manufacturer for assistance. See Service and Repair, Section 4.2

Section 4.2. Service and Repair

The borelight produt is manufactured to provide years of rugged and dependable use. In the event the borelight ever needs to be repaired, please contact Laser Devices, Inc. directly for a return authorization number. Once you obtain the return authorization number, package the product securely and return it postage paid to LDI. In the event the product is not covered by the warranty, you will be notified as to the nature and the cost of the necessary repair.

LASER DEVICES, INC.
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6. Mark the OFFSET DISTANCE below the center point marked on the target.

7. Adjust your weapon sight to the OFFSET POINT you have marked on the target.

8. Take your weapon to the range and test fire it to confirm the alignment of the sight.

DANGER: **Ballistics tables may be wrong! Errors may have crept into the published data. In addition, it should be kept in mind that ballistic performance is dependent on the characteristics of each barrel, air temperature, humidity, elevation, and a variety of other factors. In addition, a very small misalignment of the borelight may move the actual impact point several inches. As such, the offset point derived herein should always be considered an approximation. Hence, the trajectories provided herein and the information presented by any other source should be considered, at best, an approximation.**

CHAPTER 1
INTRODUCTION

USAGE

Please read this instruction manual before you attempt to use the MBS-1A borelight. While reading the manual pay special attention to items in bold text addressing **WARNINGS** and possible **DANGERS** associated with the improper use of the borelight product.

PRODUCT DESCRIPTION

The MBS-1A is a precision laser instrument used to provide a quick check for the alignment of optical scopes, open sights and laser aiming devices. This manual contains instructions relating to the operation, maintenance and troubleshooting of the MBS-1A.

1-1 GENERAL INFORMATION

A. Model Number and Equipment Name
Laser Borelight, Model MBS-1A

B. Contact Information for the Manufacturer

Laser Devices, Inc.
2 Harris Court, Suite A-4
Monterey, CA 93940 U.S.A.
Tel: (831) 373-0701
Fax: (831) 373-0903
E-mail: Sales@laserdevices.com
www.laserdevices.com

SECTION 1-2 GLOSSARY

Aiming Point	The exact point on the target that you wish to hit.
Axis of the Barrel	A straight line from the center of the weapon barrel to the target.
Bore	The inside of the weapon barrel.
Bore Rod	A part of the borelight that fits into the bore of the weapon.
Danger	Conditions or procedures that must be observed to avoid the risk of serious injury or death.
Elevation	Vertical (up/down) movement of a sight.
Insert	The plastic part used to configure the borelight for aligning different calibers of weapons.
Insert Retainer Screw	The screw part used to attach the insert to the bore rod.
Windage	Horizontal (left/right) movement adjustment of a sight.
Warning	Conditions or procedures that must be observed to avoid damage to equipment or risk of injury to persons.
Zero Point	The point on the target where the bullet will hit if the sight has been properly adjusted.

5. Assuming that you will boresight the .308 Cal. rifle firing the bullet described in the table at 50 yards, the **offset point** to be marked on the boresight target is calculated as follows:

a. add the **True Bullet Drop** of **.49 inches;** and

b. the **Expected Trajectory Height above the line of sight** at 50 meters from the ballistics table for the range at which you want to align your weapon sight. This height according to the ballistics table is **1.56 inches. See Figure 3-7 & 3-8.**

Total Offset Distance 2.05"

Sight to be zeroed for accuracy at 300 yards

Target at 50 Yards

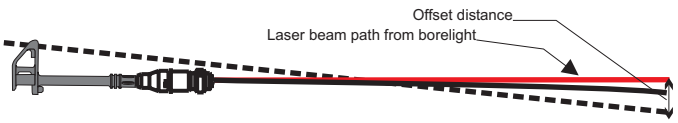


FIGURE 3-7

Close-up of target at 50 yards

Each Square Equals ½ inch

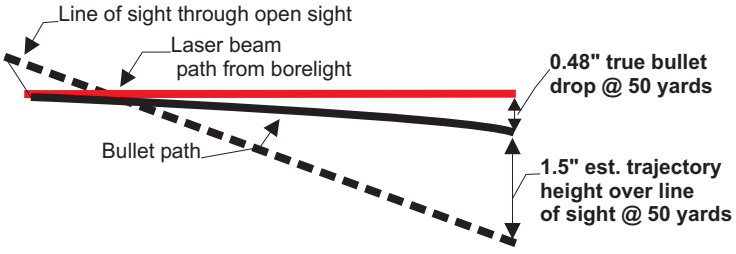

Line of sight through open sight
Laser beam path from borelight
0.48" true bullet drop @ 50 yards
Bullet path
1.5" est. trajectory height over line of sight @ 50 yards

FIGURE 3-8

Section 3.2. Calculating the Offset Distance

NOTE: Calculating the offset requires access to a complete ballistics table or, better yet, a ballistics calculator. In the alternative, you may want to check out the offset calculator available on the Internet at: http://wilson.simplenet.com/shareware/borescope/index.html.

Remember, any offset point derived using a ballistics table or a ballistics calculator should be considered an approximation of the actual aim point.

1. Measure or calculate the distance between the center of the bore and the center of the sight. For example, if you are using an iron sight, then this distance will be the distance from the center of the bore to the top of the front post. A common offset distance is 1.5 inches. See Figure 3-6.

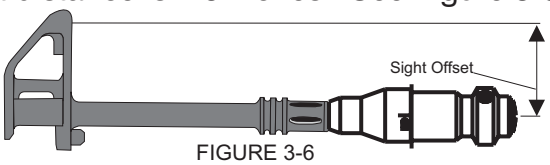


FIGURE 3-6

2. Calculate the distance between the boresight target and end of the weapon barrel. This distance is usually not less than 10 yards and may be as great as 50-100 yards, depending upon the scope to be aligned and the visibility of the laser point.

3. Determine the distance to which you want to align your weapon sight. This distance, for example, may be 200 yards or 300 yards.

4. Use a ballistics table or a ballistics calculator for the cartridge being used and determine the "**actual bullet drop"** over the distance at which you want to align your weapon sight. For example, the ballistics table may indicate that a .308 Cal. Hollow Point, Boat Tail Match King (Sierra) bullet will drop 19.75" over 300 yards. See sample table below.

SECTION 1-3 EQUIPMENT CHARACTERISTICS AND FEATURES

A. Characteristics of the Laser Borelight

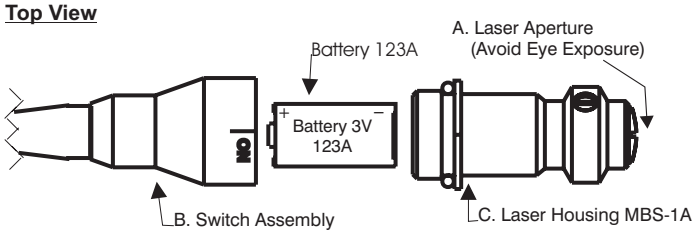
The borelight operates by projecting a laser light from the bore of the weapon to a target located at a known distance from the barrel of the weapon (usually 10 to 50 yards).

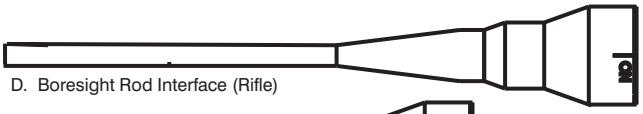
B. Features

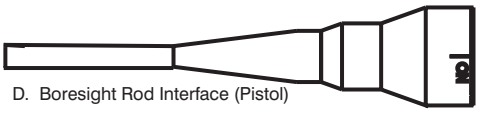
- Battery powered using a standard 3 volt lithium 123A battery.
- Easy twist-on and twist-off activation.
- Can be used in cold weather to -10°C or 0°F.
- Withstands high temperatures to +50°C or 123°F.
- May be stored without batteries at temperatures between 40°C and 80°C.
- Can be used at high altitudes to 10,000 feet.
- Waterproof to 30 feet.
- Offers an estimated 7,500 alignment activations before mean failure (not including batteries and inserts).
- Laser prealigned by the manufacturer for accuracy.

SECTION 1-4 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Top View

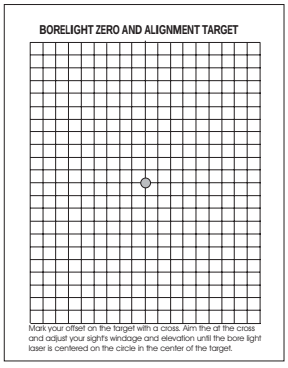




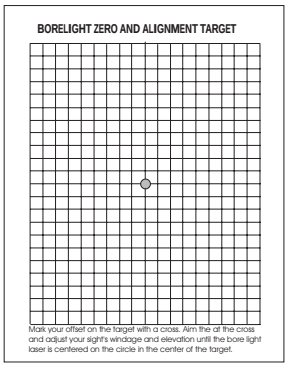


		Part #
←	E. Insert Retainer Screw Only	F2949
←	F. Insert .22 CAL/.223/5.56mm	F2964
←	F. Insert .223 CAL/5.56mm OVERSIZE	F3170
←	F. Insert .270 CAL/7mm	F2965
←	F. Insert .30 CAL/.30-06/.308 CAL/7.62mm	F2966
←	F. Insert .38 CAL/.357 CAL/9mm	F2967
←	F. Insert .40 CAL/10mm	F2969
←	F. Insert .44 CAL/.45 CAL	F2970
←	F. Insert .50 CAL	F2974
(OPTIONAL) ←	Metal Spring Insert .22/.223/5.56mm	FA 03167

Figure 1-2


BORELIGHT ZERO AND ALIGNMENT TARGET
Mark your offset on the target with a cross. Aim the at the cross and adjust your sight's windage and elevation until the bore light laser is centered on the circle in the center of the target.

G. Metric Alignment Target


BORELIGHT ZERO AND ALIGNMENT TARGET
Mark your offset on the target with a cross. Aim the at the cross and adjust your sight's windage and elevation until the bore light laser is centered on the circle in the center of the target.

G. Inch Alignment Target

NOTE: Depending upon the distance from the end of the barrel to the target that is being used to align the weapon sight, the proper alignment point for the weapon sight (i.e. the offset point) may be above or below the imaginary straight line drawn through the sight to the target. See Figure 3-4.

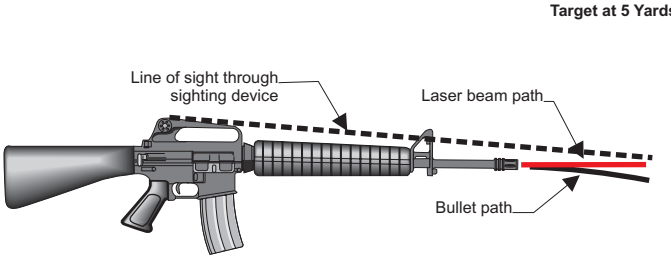


FIGURE 3-4

4. The distance between the point on the target where the laser point projected by the borelight strikes the target and the point on the target to where scope or sighting device needs to be aligned so that a bullet fired from the weapon will strike the aim point at a given range is the **"Offset Distance".** See Figure 3-5.

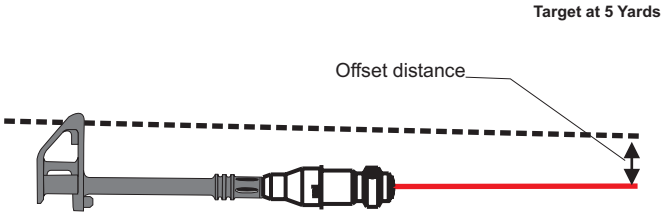


FIGURE 3-5

CHAPTER 3
CALCULATING OFFSET FOR SIGHT ALIGNMENT

Section 3.1. General Principles

1. The borelight, when properly aligned in the weapon barrel, projects a laser point on the target that is in line with the axis of the barrel. In other words, the laser light travels in a straight line from the barrel of the weapon to the target. See Figure 3-1 below.

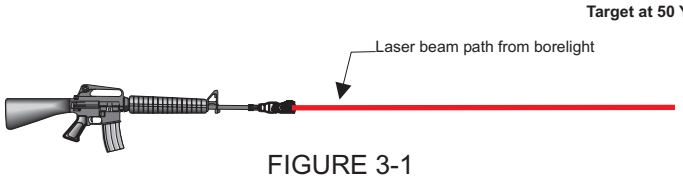


FIGURE 3-1

2. A bullet when fired from a weapon held parallel with the ground immediately starts to drop as soon as it leaves the barrel. The actual rate of drop is determined in part by the velocity of the bullet. Thus, the path of the bullet will always be below the straight line of laser light projected from the borelight. See Figure 3-2.

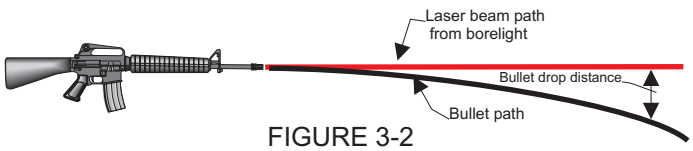


FIGURE 3-2

3. The optical scope or weapon sight is used to cant the barrel in an upward direction so that a bullet fired from the gun will trace an arc to the target. An imaginary straight line drawn through a properly aligned weapon sight attached to a weapon will trace a descending line that crosses the straight line from the bore of the weapon to the target. See Figure 3-3.

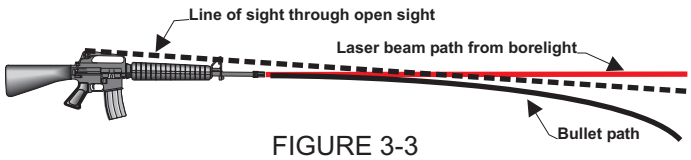


FIGURE 3-3

SECTION 1-4 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

A. Laser Aperture. The point where the laser light is emitted. **Avoid direct eye exposure to the laser light projected from this aperture.**

B. Switch Assembly. The borelight is activated by tightening the Switch Assembly against the Housing.

C. Laser Housing. The body of the borelight that contains the battery, windage and elevation adjustments and the laser diode.

D. Bore Rod. The stainless steel rod used in conjunction with the appropriate barrel insert to center the borelight in the barrel. The bore rod is supplied in two lengths -- long for aligning rifles and short for aligning pistols.

E. Insert Retainer Screw. This is the metal screw assembly that is used to attach an insert to the bore rod. **DANGER: Never use the borelight without the Insert Retainer Screw.**

F. Inserts. The plastic parts affixed to the bore rod with the Insert Retainer Screw. Each insert is sized to fit a specific caliber of barrel.

G. Alignment Targets. Paper targets with metric or U.S. units used for aligning the sight using the borelight.

1-5 PRODUCT SPECIFICATIONS

NOTE: The borelight should remain on or very close to the center of the target when the unit is rotated in the barrel of the weapon.

7. If the laser point moves off of the center point marked on the target, check to make sure the borelight was properly inserted into the weapon. Also check to make sure that the weapon is not moving slightly as you rotate the borelight. If the laser point continues to move off the center point, you may have a bent barrel, bent bore rod or a damaged Insert Retainer Screw. **If the laser point does not move from the Center Point, then you may proceed to Section 2-2, Boresighting Procedures.**

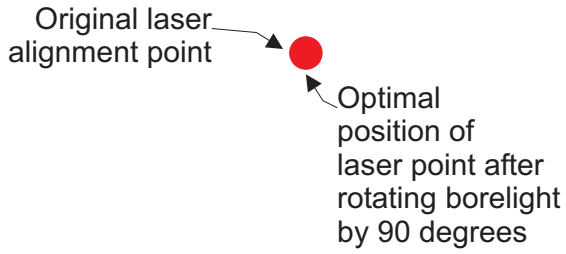


FIGURE 2-6

Section 2-3 Alignment of the Borelight with Target

1. Measure the range at which you intend to boresight your weapon.

2. Mount the weapon to be aligned on a bench or use sandbags to hold the weapon steady. The weapon shall be mounted level or parallel to the floor.

3. Activate the borelight by rotating the laser to the ON position. **Warning: Make sure the borelight and weapon are pointed in a safe direction.**

4. Place the boresight target down range at the distance at which you intend to boresight your weapon. This will usually be 10 to 25 yards.

5. Adjust the target position until the laser point is directed to the Center Point of the target. The Center Point and the target should be at the same height as the borelight.

6. Rotate the borelight 90 degrees in a clockwise direction. See Figure 2-4 below.

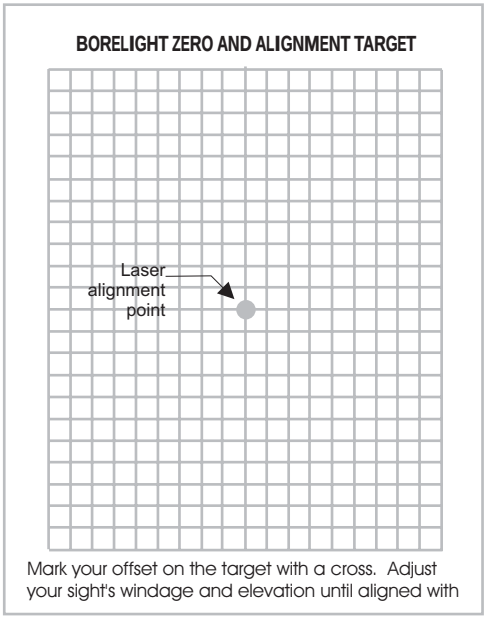

BORELIGHT ZERO AND ALIGNMENT TARGET
Laser alignment point
Mark your offset on the target with a cross. Adjust your sight's windage and elevation until aligned with

FIGURE 2-4

CHAPTER 2
OPERATING INSTRUCTIONS

Section 2-1 General

This chapter provides directions for the assembly of the borelight, and insertion of the borelight into the weapon.

Section 2-2 Assembly and Preparation for Use

A. Installation of the Battery

1. Unscrew the Laser Housing from the Switch Assembly.

2. Install the single 123A lithium battery in the direction shown on the housing. **Note: The negative terminal is inserted into the Laser Housing with the positive terminal facing the Switch Assembly. See Figure 2-1 below.**

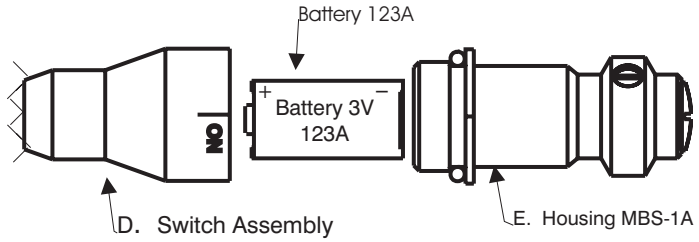


FIGURE 2-1

3. Reattach the Switch Assembly by tightening the Laser Housing until the laser activates. **Note: While reattaching the Switch Housing, make sure that the laser aperture is pointed in a safe direction to avoid any possibility of injury upon activation.**

B. Installing the Insert

1. Select the appropriate insert for the weapon to be aligned.

2. Slip the appropriately sized insert onto the Insert Retainer Screw. The widest end of the insert is slipped onto the Insert Retainer Screw first. See Figure 2-2 below.

3. Install the Insert Retainer Screw by threading it into the hole bored in the shaft of the bore rod. **Warning: Make sure not to cross-thread the Insert Retainer Screw.**

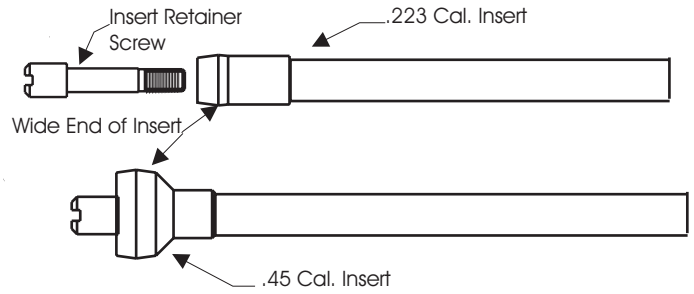


FIGURE 2-2

4. Once the Insert Retainer Screw is seated against the bore rod use a cartridge case, coin, screwdriver or knife blade to lightly tighten the Insert Retainer Screw. See Figure 2-4 below. **DANGER: Failure to properly install the Insert Retainer Screw on the bore rod may result in the insert coming loose and lodging inside the barrel of the weapon.**

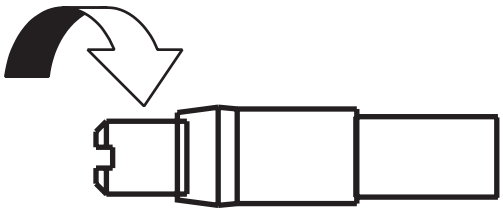


FIGURE 2-4

D. Mounting the Borelight into the Weapon Barrel

1. Confirm that the appropriately sized insert is securely attached to the interface rod using the Insert Retainer Screw.

2. Grasp the borelight and insert the bore rod into the bore. **Note: A properly sized insert should offer a firm fit. If the insert cannot be inserted into the barrel of the weapon with firm pressure, then confirm that the appropriately sized insert was installed on the bore rod. Likewise, if the bore rod slips into the bore without any pressure being applied, then the insert may be too small.**

3. Firmly press the bore rod into the barrel of the weapon until the tapered or cone shaped area of the bore rod contacts the bore.
WARNING: Apply force in a straight line with axis of the barrel to avoid the possibility of bending the bore rod or the Insert Retainer Screw.